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(54) Hair conditioning composition
and method

(57) An aqueous composition useful
for conditioning hair consisting
essentially of an aqueous carrier
containing a cationic polymer and
amphoteric surfactant in specified
proportions and having a pH in the
range of from about 1 to about 6.

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SPECIFICATION

Hair conditioning composition and method

- 5 This invention relates to compositions that are useful in conditioning hair and to processes for conditioning hair by employing such compositions.

10 It is known in the prior art to treat hair with certain quaternary amine compounds for the purpose of conditioning hair i.e. to improve its combability, manageability, softness, etc. Although such prior art compositions have proven to be effective in varying degrees, one of the chief drawbacks has been the fact that the effect has not been long-lasting i.e. it does not survive repeated shampoos.

15 It is accordingly an object of the present invention to provide a hair conditioning composition that retains its conditioning effect through repeated hair shampoos.

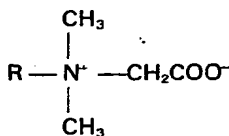
20 It is also an object of the present invention to provide a process for treating hair using the aforesaid composition which has a conditioning effect on the hair that is relatively stable to repeated shampoos.

25 Other and more detailed objects of this invention will be apparent from the following description and claims.

30 The present invention relates to compositions for conditioning hair, which includes, based on the total weight of the composition, from about 0.4% to about 10% of at least one cationic polymer, from about 0.2% to about 20% of an amphoteric surfactant; and sufficient acid to give the composition a pH in the range from about 1 to about 6; the ratio:

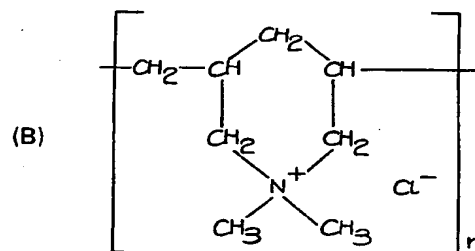
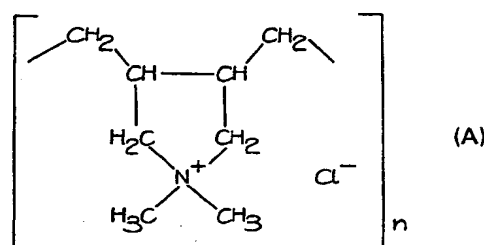
$$\alpha = \frac{\text{polymer (mer)}}{\text{detergent (mol)}}$$

35 being from about 0.2 to about 5; in an aqueous carrier. Optionally the composition also includes an effective amount, such as from about 0.1% to about 5% of a betaine having the formula:



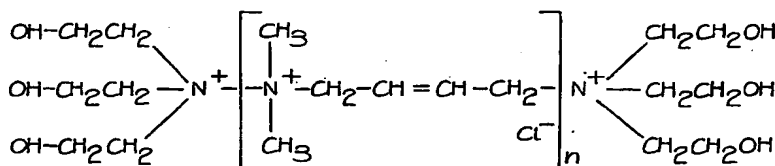
wherein R is a long chain aliphatic radical containing from about 10 to about 24 carbon atoms. The present invention also involves a method for conditioning hair which has been previously treated with an agent having an alkaline pH, by applying thereto the composition of this invention.

45 The cationic polymers that are useful for the purposes of the present invention can vary somewhat. Three classes of polymers that have been found to be particularly useful are those sold under the trade names MERQUAT (e.g. MERQUAT 100), ONAMER (e.g. ONAMER M) and quaternized polyvinylpyridine. 50 The MERQUAT 100 is a polymer of dimethyldiallyl ammonium chloride and are probably mixtures of compounds having the following formula:



Wherein n is a cardinal number dependent on molecular weight. These can vary in molecular weight, however, ordinarily the polymers of this class that will be employed have a molecular weight in the range of from 4,000 to 550,000 and preferably in the range of from about 20,000 to about 100,000.

60 The ONAMER type polymers that are useful for the present purposes are poly(dimethyl butenyl ammonium chloride)- α,ω -bis(triethanol ammonium chlorides) that may be described by the formula:

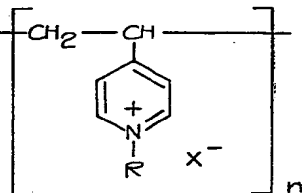


Certain of the chemical formula(e) appearing in the printed specification were submitted after the date of filing, the formula(e) originally submitted being incapable of being satisfactorily reproduced.

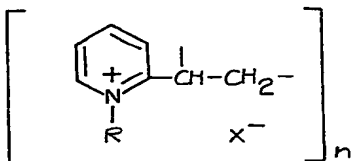
Wherein n is a cardinal number dependent on molecular weight.

The molecular weights of these ONAMER type polymers that may be employed herein can also vary somewhat. For the most part, however, this will be in the range of from about 800 to about 5,000 and preferably, in the range of from about 1,000 to about 3,000.

The polymers and copolymers of quaternized polyvinylpyridine that can be used in accordance with this invention are described by the general formula:

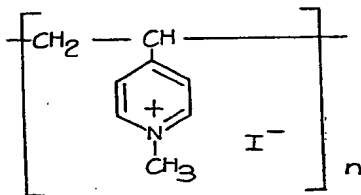


or



Where n is a cardinal number depending on molecular weight, R is an alkyl radical of C_1 - C_{20} and the X^- is a cosmetically acceptable anion such as halide, sulfate or carboxylate. These also will have a weight average molecular weight in the range of from about 5,000 to about 100,000.

As an example of the cationic polymer of this group, the following may be mentioned:



polyvinyl methyl pyridinium iodide

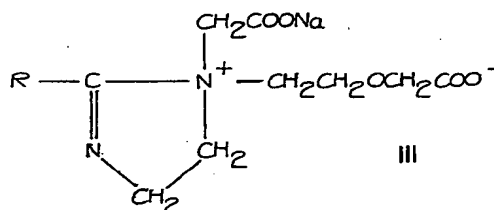
Where n is the cardinal number depending on molecular weight. The weight average molecular weight is suitably about 50,000.

The quantity of cationic polymer contained in the present aqueous solutions will depend on the particular results that are desired. Ordinarily, this will constitute between about 0.4% to about 10% by weight based on the total weight of the aqueous composition with the optimal range being between about 1% to about 5% on the same weight basis.

The second essential component of the compositions of this invention are the amphoteric surfactants. A characteristic of these materials is that many assume the character of an anionic or a cationic surfactant compound depending upon the pH of the solution in which it may be contained.

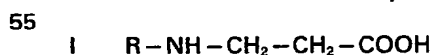
There are a number of amphoteric detergents that are suitable for use in the present invention. How-

ever, two classes of detergents have been found to be especially effective. The first class can be defined by the formula:



in which R is a long chain fatty radical containing from 10 to 18 carbon atoms. A typical example of such a compound or compounds is the case in which R represents coconut fatty radicals. A material of this character is sold under the trade name MIRANOL C2MSF and is described in the CTFA Cosmetic Ingredient Dictionary (1973) under the name AMPHOTERIC-2.

A second class of amphoteric detergents that is particularly effective for the purposes of the present invention can be defined by the formula:



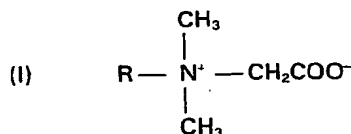
wherein R is a long chain fatty alkyl group having from 10 to 18 carbon atoms. An example of such a detergent is marketed under the trade name

DERIPHAT 170C in which the R in formula IV is a mixture of lauryl and myristyl fatty alkyl groups. This material is described in the CTFA Cosmetic Ingredient Dictionary (1973) as Lauraminopropionic Acid.

The quantity of amphoteric detergent which will be contained in the composition of this invention will vary somewhat again depending on the economics and the results sought. However, usually this will be in the range of from about 0.2 to about 20% by weight and ideally in the range of from about 1% to about 5% by weight based on the total weight of the composition.

Another essential feature of the present composition is that the solution have an acid pH that is a pH that falls in the range of from about 1 to 6. Any of a variety of acids may be used in adjusting the pH of these compositions to the proper level, hydrochloric, citric, and phosphoric acids were found to be particularly useful and suitable.

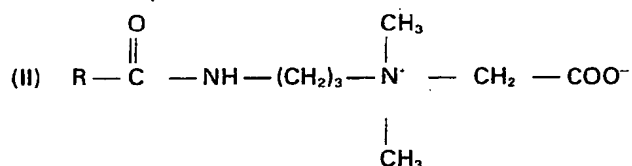
The betaines that are optionally useful for the purposes of the present invention are of the formula:



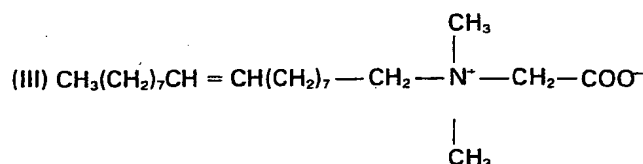
in which R is a long chain aliphatic radical containing 10 to 24 carbon atoms. As used herein, the term long chain aliphatic radical includes saturated and unsaturated straight chain and branched chain radicals, hydrocarbon radicals as well as chain radicals that include other atoms in addition to carbon atoms in the chain (e.g. oxygen, nitrogen, etc.).

By way of illustrating typical betaines that may be

used in this invention, mention may be made of cocamidopropyl betaine, oleyl betaine, cetyl betaine, coco betaine, etc. Cocamidopropyl betaine is described by the formula:



5 wherein RC— is the coco fatty acid acyl radical. Coco fatty acid is a mixture of fatty acids obtained from Coconut Oil which are predominantly C₁₂ acids. Oleyl betaine, on the other hand, has the formula:



10 Structurally the coco betaine and cetyl betaine resemble the oleyl betaine shown in formula III above excepting that the oleyl radical is replaced with coco fatty radicals or the cetyl radical respectively. A number of betaines that are useful for the purposes

15 of the present invention are available commercially. Among these mention may be made of CHEMADENE NA 30, LONZAINE 12C, LONZAINE 14C, LONZAINE 165, etc.

The quantity of the betaine that may be incorporated in the composition of the present invention may vary. Usually, it will comprise between about 0.1% to about 5% by weight and preferably between about 0.3% to about 3% by weight based on the total weight of the composition.

25 Although the cationic polymers, the amphoteric surfactants and the acids mentioned above are the essential active ingredients in the present compositions, the compositions contemplated by the present invention may also contain other ingredients which may serve to improve the organoleptic character of the product or its ease of application. Thus, it is within the purview of this invention to incorporate in the present compositions one or more of such materials as fragrances, thickening agents, fragrance

35 solubilizers, bactericides, etc.

Optionally a variety of solvents can be employed in the compositions of this invention. These will usually take the form of an aliphatic alcohol, either a monohydric or polyhydric, preferably having from 1 to 6 carbon atoms. As employed herein, the term "aliphatic alcohol" is used in its generic sense and includes such alcohols as straight chain and branched chain alkyl alcohols that can be monohydric or polyhydric (e.g. dihydroxy) ether alcohols, ester alcohols, etc. By way of illustrating the solvents that may be useful for the present composition, mention may be made of ethanol, carbital, hexylene glycol, propylene glycol. The solvents may be used

at levels from 0% to about 50% and preferably in the 50 range of from 0% to 5% by weight based on the total weight of the composition.

Optionally, a neutral surfactant may also be incorporated in the compositions of this invention. These will constitute between 0% to 10% by weight based on the total weight of the composition but more often, a range of 0% to 2% is preferred. Suitable examples of such neutral surfactants are Igepal CO-630 (CTFA name nonoxynol-9); Arlasolve 200 (polyoxyethylene(20)isohexadecyl ether); Tween 20 (CTFA name polysorbate 20).

To facilitate the application of the present compositions to the hair it is often useful to increase its viscosity somewhat. Many thickening agents can be used for this purpose. Among these mention may be made of hydroxyethyl cellulose, carboxymethyl cellulose, the Carbopols e.g. Carbopol 940. However, hydroxyethyl cellulose has been found to be particularly suitable. The concentration of the thickening agent may vary somewhat depending on the results desired. Usually, this will be present in the range of from 0% to about 10% by weight based on the total weight of the composition.

It is often useful to incorporate a bactericide in the compositions of this invention. A variety of materials are known in the prior art that will serve this purpose. By way of illustration, mention may be made of a material sold under the trade name DOWICIL 200. This is identified in the CTFA Cosmetic Ingredient Dictionary, second edition, as quaternium-15 and chemically as 1 - (3 - chloro - allyl) - 3,5,7 - triaza - 1 - azoniaadamantane chloride. The quantity of bactericide that will be contained in the present compositions will vary somewhat depending on the nature of the particular composition. Usually, however, it will comprise between 0% to about 10% by weight based on the total weight of the composition.

Aside from the absolute quantities of the cationic polymer and amphoteric detergent contained in the present compositions, it has been found that their conditioning effectiveness is highly dependent upon the "molar ratio" of polymer to detergent. The term "molar ratio" as used herein is designated by the letter α and is defined as:

$$95 \quad \alpha = \frac{[\text{Polymer (mer)}]}{[\text{Detergent (mol)}]}$$

In the above expression and elsewhere in the specification and claims, the term [Polymer (mer)] refers to the number of mols of the repeating units of the polymer contained in the composition and bearing a positive charge. The term [Detergent (mol)] in the aforesaid expression and elsewhere is defined as the number of mols of detergent contained in the composition. The ratio α may vary somewhat. Ordinarily, this will be in the range of from about 0.2 to about 5 and and preferably in the range of from about 1 to about 2.

The compositions of this invention may be applied to hair in any suitable manner. One typical procedure involves applying the conditioning composition, such as described in Example 1 below to freshly dyed or bleached hair, working it gently into the hair mass, leaving the said composition on hair for one to

three minutes and rinsing the hair thoroughly with water prior to combing and drying. Amount of the conditioning composition applied to hair may vary, in general, should not be less than 1% of the hair weight and does not need to exceed 20% of hair weight.

It is generally visualized that the compositions of this invention will be applied to hair that has previously been given a treatment that leaves the hair somewhat alkaline. Typical of such treatment are treatments with oxidation hair dye systems or bleaching systems. One such treatment involves mixing a dye base containing among other things the oxidation dye intermediates with an aqueous vehicle containing an oxidizing agent such as hydrogen peroxide and then shampooing this mixture into the hair. These mixtures before being applied to the hair usually have an alkaline pH e.g. in the range of from 7 to 12 and preferably 8 to 11. Another such treatment involves for example treating the hair with an alkaline bleaching solution which contains the usual oxidizing agent (e.g. aqueous hydrogen peroxide), boosters (e.g. potassium persulfate and ammonium persulfate), alkalizing agents, etc. When the compositions of this invention are applied to hair that has been previously treated as indicated above the combination of amphoteric detergent and cationic polymer precipitates out on the hair forming a conditioning complex that is retained on the hair throughout repeated shampooings.

The pH of the hair conditioning compositions that are employed in the present invention will be selected to some extent on the basis of the alkalinity of the hair to be treated and the relative amounts of cationic polymers and amphoteric detergent. In general, the pH is selected so that after the composition is applied to the hair and comes under the influence of the alkalinity of the hair that the pH of the composition is increased by approximately 1 pH unit above which the precipitation of the complex takes place. Generally, under these conditions the optimum precipitation of the conditioning complex appears to take place.

The following Examples are given to further illustrate the present invention. It is to be understood, however, that the invention is not limited thereto.

Where the CTFA name is given herein, reference is made to the name given to the material in the CTFA Cosmetic Ingredient Dictionary of 1973 or the 2nd Edition of 1977.

EXAMPLE 1

	Ingredient	% by Wt.
55	* Merquat 100	2.00
	** Miranol C2MSF	4.00
	Hydroxyethyl cellulose	2.00
60	Phosphoric acid	1.60
	Fragrance	0.10
	Water QS to	100.00
	pH 4.5	
	* CTFA name Quaternium-40	
65	** CTFA name Amphoteric-2	

EXAMPLE 2

	Ingredient	% by Wt.
***	Onamer M	1.00
	Miranol C2MSF	2.00
70	Hydroxyethyl cellulose	2.00
	Phosphoric acid	0.90
	Fragrance	0.10
	Water QS to	100.00
	pH 4.5	
75	*** poly(diethyl butenyl ammonium chloride) - α ,1-bis (triethanol ammonium chloride) Av. M.W. about 1,000-2,000	

EXAMPLE 3

	Ingredient	% by Wt.
80	Poly-4-vinyl methyl pyridinium iodide	2.00
	Miranol C2MSF	4.00
	Hydroxyethyl cellulose	2.00
85	Phosphoric acid	1.60
	Fragrance	0.10
	Water QS to	100.00
	pH 4.5	

EXAMPLE 4

	Ingredient	% by Wt.
	Poly-4-vinyl lauryl pyridinium sulfate	1.00
95	Merquat 100	1.00
	Miranol C2MSF	4.00
	Hydroxyethyl cellulose	2.00
	Phosphoric acid	1.60
	Fragrance	0.10
100	Water QS to	100.00
	pH 4.5	

EXAMPLE 5

	Ingredient	% by Wt.
105	Merquat 100	3.50
	Miranol C2MSF	1.75
	Hydroxyethyl cellulose	2.00
	Sodium hydroxide	0.01
	Phosphoric acid	0.07
110	Ethanol	4.00
	Chemadene NA-30 ¹	2.00
	Water QS to	100.00
	pH 4.5	
1	Made by the Richardson Chemical Company. Its CTFA name is Cocamidopropyl betaine.	

EXAMPLE 6

Same as Example 5 except that 2.00% oleyl betaine is used in place of the cocamidopropyl betaine used in Example 5. This composition had a pH of 4.5.

The following procedures illustrate the use of the conditioning agent of this invention after a hair bleaching treatment. It has been found that treatment of bleached hair with the present compositions also improves its feel and combability.

Two 3 gram swatches of brown Caucasian hair were bleached for 1 hour at 30°C with 20 grams of the following bleach composition.

COMPOSITION B

% by Wt. based on
total weight of
composition

5	Potassium persulfate	11.0
	Ammonium persulfate	6.0
	Sodium stearate	3.5
	Sodium metasilicate	3.5
	Hydrogen peroxide	3.5
10	Cab-O-Sil	2.5
	EDTA	0.5
	Methocel	0.8
	Water QS to	100.0
15	pH 10.3	

After bleaching, the hair was thoroughly rinsed and one of the bleached tresses was treated for 3 minutes with 1.5 g of the following composition:

20	EXAMPLE B5	
	<i>Ingredient</i>	<i>% by Wt.</i>
	Merquat 100	2.0
	* Deriphath 170C	2.4
25	Benzyl alcohol	3.5
	Phosphoric acid (85%)	1.1
	Water QS to	100.0
	* Lauraminopropionic acid	

30 The other tress was exposed for the same length of time to the same conventional hair conditioner as above. Both tresses were thoroughly rinsed and

found to be soft and silky to feel and easy to comb. Both tresses were then shampooed once and compared again. This time the conventionally conditioned tress felt sticky, rubbery and difficult to comb; while the tress that had been treated with conditioning composition given in Example B5 retained the softness of feel and ease of combing. These conditioning attributes were still much in evidence for this tress after as many as 4 shampoos.

<i>Ingredient</i>		<i>% by Wt.</i>		
		<i>Ex. 7</i>	<i>Ex. 8</i>	<i>Ex. 9</i>
45	Merquat 100	5.00	→	→
	Hydroxyethyl cellulose	2.250	→	→
	Phosphoric Acid	0.450	→	→
	Sodium hydroxide	0.015	→	→
50	Miranol C2MSF	2.560	→	→
	Sorbic acid	0.100	→	→
	Dowicil 200*	0.100	→	→
	Carbitol	3.00	→	→
	Cocamidopropyl betaine	0.600	→	→
55	Fragrance	0.400	→	→
	Tween 20**	—	.001	—
	Arlasolve 200***	—	—	.001
	Water to 100%	→	→	→
	pH	4.8	4.5	4.5

60 * CTFA name Quaternium-15

** CTFA name Polysorbate-20

*** Polyoxyethylene (20) isohexadecyl ether

<i>Ingredient</i>		<i>% by Wt.</i>					
		<i>Ex. 10</i>	<i>Ex. 11</i>	<i>Ex. 12</i>	<i>Ex. 13</i>	<i>Ex. 14</i>	<i>Ex. 15</i>
65	Merquat 100	5.0	—	—	5.0	5.0	5.0
	Hydroxyethyl cellulose	2.25	→	→	→	→	→
	Sodium hydroxide	0.15	→	→	→	→	→
	Phosphoric acid	.2	0.46	→	→	→	→
	Deriphath 170C ²	2.0	—	—	—	—	—
70	Miranol C2MSF	—	2.56	→	→	→	→
	Sorbic acid	0.1	0.10	→	→	→	→
	Dowicil 200	.10	0.10	→	→	→	→
	Carbitol	3.0	→	→	→	→	→
	Fragrance	.40	→	→	→	→	→
75	Chemadene NA-30 ³	2.0	2.0	2.0	—	—	—
	Merquat 550 ⁴	—	—	12.5	—	—	—
	Onamer M ⁵	—	5.0	—	—	—	—
	Lonzaine 12C ⁶	—	—	—	2.0	—	—
	Lonzaine 14 ⁷	—	—	—	—	2.0	—
80	Lonzaine 16S ⁸	—	—	—	—	—	2.0
	Water to 100%	→	→	→	→	→	→
	pH 4.5	→	→	→	→	→	→
	2 CTFA name Lauraminopropionic acid						
	3 CTFA name Cocamidopropyl betaine						
85	4 CTFA name Quaternium-41						
	5 Poly(dimethyl butenyl ammonium chloride) α,ω -bis(triethanol ammonium chloride)						
	6 CTFA name Coco betaine						
	7 CTFA name Lauryl betaine						
90	8 CTFA name Cetyl betaine						

Conditioning formulations of this invention are not only effective in improving wet and dry combing of hair, imparting manageability, softness, etc. but

95 unlike the conventional products, their conditioning effects are stable to repeated shampoos. This conditioning durability is illustrated in the following

experiment, the dyed hair being used as the test substrate.

Swatches of intact Caucasian hair were colored with Composition A below for 20 minutes, in accordance with the procedure of the instructions. The ratio of the amount of solution to weight of hair, temperature and quantity of water used for rinsing after treatment, were all maintained so as to simulate conditions on the head. After rinsing, a conventional hair condition in which the conditioning ingredient was Steareikonium chloride (CTFA name) and on another similarly treated swatch the conditioning material of Example 1 and on a similarly treated swatch the composition of Example 5 above was applied to hair (0.1 g of each product per 1 g of hair). Both were worked in for 30 seconds and left on the hair for additional 1 minute after which time the hair was rinsed and combed. The combing measurements were performed by the procedure described in the paper by Garcia and Diaz (J. Soc. Cosmt. Chem. 27, 379-398, 1976). The test essentially involves passing of a hair tress through a comb attached to a strain gauge which in turn is connected to a recording device. Work is expended to accomplish the passage of the hair tress through the comb, and this work, read off the integrator, is the objective measure of combing ease/difficulty.

Having determined the combing properties of hair after coloring and conditioning treatment, the swatches were shampooed with HERBAL ESSENCE™ shampoo three or more times and again tested for combing. The shampooing procedure involved application of the shampoo (0.1 g per 1 g of hair), working it into the hair over the period of 60

seconds to produce a copious lather and rinsing the shampooed hair for at least 1 minute. Each shampoo step consisted of two lathering/rinsing sequences.

The results of combability tests are summarized in Table I below. In the Table, the "Work of Combing" is expressed in units of work (gcm). The higher the values, the harder it was to comb the hair.

COMPOSITION A

	Ingredient	% by Wt. based on total weight of composition
45	p-Phenylenediamine	0.35
	N,N-bis (2-hydroxyethyl) 0-p-phenylenediamine sulfate	0.17
50	Resorcinol	0.31
	1-Naphthol	0.08
	Oleic acid	7.50
	Propylene glycol	4.40
55	Isopropanol	4.35
	Hydrogen peroxide	3.00
	*Octoxynol-1	3.50
	Sulfated Castor Oil	1.50
	Ammonium hydroxide	1.15
60	*Cocamide DEA	0.75
	Fragrance	0.15
	Sodium sulfite	0.05
	EDTA	0.01
	Water QS to	100.00
65	pH 9.8	

* CTFA name (See CTFA Cosmetic Ingredient Dictionary, 2nd Edition, 1977)

Treatment with	TABLE I Average combing work (gcm) on wet hair				
	No shampooing	+3 shampoos	+4 shampoos	+5 shampoos	+6 shampoos
(A) After dyeing	2,800				
(A) + Conventional conditioner	625	7,350			
(A) + Conditioner of Example 1	346	769			
(A) + Conditioner of Example 5	228		349	438	531
(A) + Conditioner of Example 7	580		641	809	916

The last two results in Table I have been further confirmed in experiments on live heads.

It should be noted that betaines by themselves do not effect any conditioning when applied in a formulation in combination with the cationic polymer e.g. MERQUAT 100 or ONAMER M. It is only when other amphoteric, such as the ones described above, are also present in the formula that additional conditioning is obtained from the use of the betaine.

CLAIMS

1. A composition for conditioning hair consisting essentially of based on the total weight of the composition:

(a) from about 0.4% to about 10% of at least one cationic polymer;

(b) from about 0.2% to about 20% of an amphoteric surfactant; and

(c) sufficient acid to give the composition a pH in the range of from about 1 to about 6; the ratio

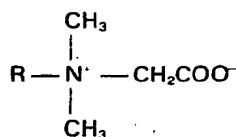
$$\alpha = \frac{[\text{polymer (mer)}]}{[\text{detergent (mol)}]}$$

being from about 0.2 to about 5; in

(d) an aqueous carrier.

2. A composition according to claim 1 in which said ratio is in the range of from about 1 to about 2.

3. The composition of claims 1 or 2, further comprising from about 0.1% to about 5% of at least one betaine of the formula:

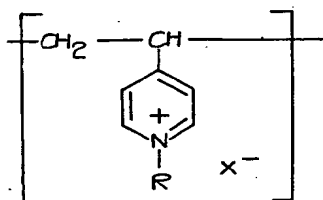


5 wherein R is an aliphatic radical with about 10 to about 24 C atoms.

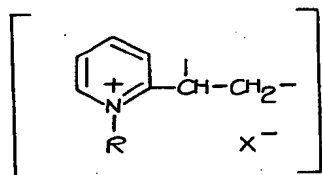
4. The composition of claim 3 in which said betaine is at least one of cocamidopropyl betaine,
10 lauryl betaine, oleyl betaine, cetyl betaine and coco betaine.

5. A composition according to claims 1 or 2 in which said cationic polymer is homopolymer of dimethyl diallyl ammonium chloride.

15 6. A composition according to claims 1 - 4, in which said cationic polymer is homo- or copolymer of a quaternized polyvinyl pyridine having monomeric units of the formula:



Or

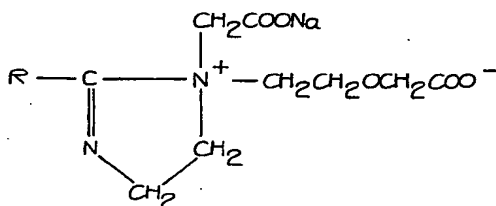


Where R is an alkyl radical of C₁-C₂₀ and the X⁻ is a
20 cosmetically acceptable anion and having a weight average molecular weight in the range of from about 5000 to about 100,000.

7. The composition of claim 6, wherein said anion is a halide, sulfate or carboxylate.

25 8. A composition according to claims 1 - 4, in which said cationic polymer is a poly(dimethyl butenyl ammonium chloride)-α,ω-bis(triethanol ammonium chloride).

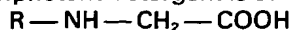
9. A composition according to claims 1 - 8,
30 wherein said amphoteric detergent is of the formula:



in which R is a long chain fatty radical containing 10 to 18 carbon atoms.

10. A composition according to claim 9, wherein R is a coco fatty radical.

35 11. A composition according to claims 1 to 8 in which said amphoteric detergent is of the formula:



in which R is a long chain fatty alkyl radical having from 10 to 18 carbon atoms.

40 12. A composition according to claims 1 - 11, further including aliphatic monohydric or polyhydric alcohol solvent, suitably having between about 1 and about 6 carbon atoms.

13. A method for conditioning hair which comprises applying to said hair a composition defined in any of the claims 1 to 12 for sufficient time to improve its combing characteristics and/or its manageability and/or its softness.

14. In a process for conditioning hair which has
50 been previously subjected to the treatment with a treating agent having an alkaline pH, the improvement which comprises applying to said pre-treated hair a composition as defined in any of the claims 1 to 12 for sufficient time to improve its combing
55 characteristics and/or its manageability, and/or its softness.

15. A process according to claim 14 in which the pH of said previous employed treating agent is in the range of from about 7 to 12.

60 16. A process according to claim 14 in which the pH of the said previous employed treating agent is in the range of from about 8 to 11.

17. A composition according to claim 1 substantially as described in any of the foregoing Examples.

65 18. A method or process for conditioning cut hair which is as defined in claim 13, 14, 15 or 16.

19. Conditioned cut hair obtained by a method or process as claimed in claim 18.

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